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Book Review: *Grazing Management*, 2nd ed.

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BOOK REVIEWS

Plant-Environment Interactions, 2nd ed. Edited by R.E. WILKINSON. Marcel Dekker, Inc., 270 Madison Avenue, New York, NY 10016. 2000. Hardback, 456 pp., \$175. ISBN 0-8247-0377-4.

This book is a comprehensive reference book on plant-environment interactions. This second edition, by the same editor, emphasizes simultaneous effects of two or more stress factors on plant growth, whereas the first edition focused on plant responses to individual stresses. The second edition consists of 15 chapters, covering most important environmental factors that affect plant growth. All chapters are written by experts in the field, most of them academic staff at U.S. universities. Most chapters are review articles. Plant growth under adverse soil conditions is well covered in the book. One chapter describes experimental results of multiple stress factors and a few other chapters are reviews that emphasize the results of specific research groups.

Chapters 1 through 5, 8, 13, and 15 are review papers on soil environment-plant growth interactions. Topics covered in these chapters are genetic resources, breeding methodology, and plant improvement under acid soil constraints (Chapter 1); the role of roots in drought resistance (Chapter 2); mineral nutrition (Chapter 3); root plasticity in exploiting water and nutrient heterogeneity (Chapter 4); acidic and alkaline soil constraints on plant mineral nutrition (Chapter 5); waterlogging (Chapter 8); soil physical constraints (Chapter 13); and phytoremediation (Chapter 15). Chapters 1 and 5 review an important area of acid soil problems, but with different emphases. Chapter 1 deals with plant improvement and lists gene action and the number of genes involved in Al and Mn toxicity and Ca, K, Mg, and P deficiency; Chapter 1 then tabulates appropriate selection methods and selection criteria for improved plant tolerance to acid soil environments. Chapter 5 describes toxicity and deficiency symptoms of the most important elements for plant growth under acidic and alkaline soil conditions. In Chapter 3, 12 important nutrients for plant growth are systematically described in relation to their uptake and translocation, physiology, and interaction with other elements. Nitrogen, which was missing in the previous edition, is added in this edition of the book. Chapter 13 describes how soil physical constraints affect plant growth, but it also discusses how plant factors contribute to the development of soil physical constraints.

Most other chapters are reviews of above-ground environment factors and plant growth interactions. Thus, cold tolerance and the effects of humidity and wind are covered in Chapters 10 through 12, respectively. In Chapter 12, physiological mechanisms of acclimation to cold are well described, and recent developments in molecular biology and genetic control of cold tolerance are discussed in relation to development of freezing tolerant cultivars. Overlap of the expression of some cold tolerance genes with that drought responsive genes indicates that different stresses may be regulated to some extent by the same genes. Chapter 7 covers the topic of irrigation of turf with effluent water; the authors competently reviewed potential hazards of effluent in relation to salinity, osmotic effect, high nitrates, nitrous oxide emission, pathogens, and heavy metals. Management of effluent irrigation water is also fully described. Chapter 9 describes the role of heat shock proteins in creeping bentgrass; the physiological mechanisms

of how these proteins protect cells from heat are well illustrated and a gene analysis is shown. Chapter 14 describes a history of the discovery and subsequent understanding of functions of phytochrome and its role in germination, light competition and flowering, and implication for crop production. Chapters 9 and 14 are review papers with a strong emphasis on the work done at particular institutions. These interesting chapters cover many years of research at the authors' institutions.

Chapter 6 describes the results of experiments on multi-stress factors and their interaction on sorghum growth. While a series of experiments conducted was specific to fungicide, low pH, and nutrient toxicity and deficiency interactions, the chapter illustrates the complexity of interactions between stress factors and their effects on plant growth, and that careful experimentation is required to identify these complex interactions.

Since the book is written by a number of authors, chapters vary greatly in size, style, and degree of comprehensiveness. Some are quite comprehensive with excellent summaries of recent developments, whereas others emphasize experimental details under rather specific conditions. Some chapters would be useful to advanced undergraduate students for a general understanding of the topic covered, whereas other chapters are useful as references for experienced scientists in specific fields of interest.

The book covers most important environmental constraints and their interactions with plant growth, but a few topics are not covered. Water shortage is very common and affects plant growth in many parts of the world. There is a chapter on root characteristics in drought resistance, but there is no coverage of shoot characteristics in drought resistance or general aspects of water deficit and plant growth. Future increase in atmospheric CO₂ concentration is of concern to most of us and much plant research has focused on this subject in recent years, but it is not covered.

The book is of high quality in general with extensive reference lists. Photographs are useful, but the black and white photographs used in the book often are not ideal for showing plant growth responses to environmental stresses.

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Grazing Management, 2nd ed. J.F. VALLENTINE. Academic Press, 525 B Street, Suite 1900, San Diego, CA 92101-4495. 2001. Hardback, 659 pp. \$89.95. ISBN 0-12-710001-6.

Grazing management is critical in obtaining optimum production from grasslands and maintaining the grazing resource. Grazing management involves a complex relationship among the herbivores, vegetation, and other biotic and abiotic factors. Proper grazing management of grazing lands has a tremendous importance in agriculture and natural resource conservation because much of the earth's surface is covered with grazable vegetation. This book is an updated second edition of *Grazing Management*, which was first published in 1990. This edition is increased in size and coverage compared with the first edi-

tion. A lot of progress in grazing management has been made in the 11 years since the first edition was published, so this new edition is necessary to communicate the new information, concepts, and application. This edition has 16 chapters, an appendix consisting of a table of weights and measures, and a glossary of terms related to the study of grazing management.

Chapter 1 is the introduction to grazing management illustrating its importance and application, and the role of grazing as an ecosystem component. It has a very broad scope and introduces terminology and defines many kinds of grazing lands. Chapters 2 and 3 present a detailed summary of grazing herbivore nutrition and nutritional balance. Ruminant and cecal herbivore digestive systems are compared and the nutrient requirements of various types of herbivores are reviewed. In Chapter 3, monitoring nutritional status of grazing animals is addressed and nutritional aspects of forage are discussed along with antinutritional agents. Chapter 4 relates grazing to seasons and illustrates the forage growth cycle, seasonal differences, and balancing supply and demand. Chapter 5 features the relationship between defoliation and plant physiology and morphology. A portion of the chapter is devoted to grazing effects on soil chemical and physical properties. Chapter 6 involves grazing activities and animal grazing behavior. Chapters 7 and 8 address spatial patterns in grazing and methods of manipulating grazing distribution. In these chapters, site preference is discussed and watering, fencing, salting, and handling of animals are related to grazing distribution. Chapter 9 addresses plant selectivity and animal preference. Chapters 10 and 11 discuss kind of grazing animals, including grazing animal intake and equivalence. Alternative large herbivores to traditional livestock species are included, too. Mixed grazing also is addressed in this chapter. Chapters 12 and 13 address grazing capacity and grazing intensity. Included here are the determination of stocking rates and effects of grazing intensities on sites, animals, and production economics. Chapters 14 and 15 discuss grazing methods and systems. These two chapters build on the others to relate principles to the application of grazing methods in the development of grazing systems. Chapter 16 is a completely new chapter which discusses grazing and the use of the grazing animal as an environmental, manipulative tool for biological plant control, habitat management, seeding, and forest regeneration.

The book is extremely thorough in the basics and application of grazing management. This edition includes much more on wild ungulates grazing as an ecosystem component than does the first edition. It is very well balanced and applies grazing principles across many kinds of grazing resources and grazing animals. The book is extensively documented with many literature references. Although there are world-wide references, the majority are from North America with strong coverage of western rangeland grazing. The principles developed in this book have application in many grazing lands with a wide variety of large ungulates.

The book contains numerous diagrams and flow charts that help with the understanding of concepts and interactions. There are many photographs in the book, although the quality varies. Photograph captions often make key statements, so the photographs have a way of focusing the reader's attention on key items, sometimes general concepts and sometimes specific points. The book contains a number of large summary tables that illustrate such things as livestock responses under various grazing management schemes and botanical composition of diets from studies of domestic and wild herbivores grazing various vegetation types. Each line of these tables represents a study and each is referenced. The 20-page glossary of grazing, plant, and animal terms provides an excellent resource and is essential for most readers. The book uses English

units throughout which makes it useful for U.S. applications but may offer somewhat of a limitation for international applications. The appendix contains equivalent weights and measures which would assist in making key conversions. The basic principles and practices should apply throughout the world.

This book would be an excellent textbook for teaching an upper-class or graduate level college class concentrating on grazing management. It would provide the background and set the stage for class discussion. It would be a valuable resource for most instructors showing all of the aspects that could be considered in a grazing management course. The book is an excellent reference for anyone involved with grazing herbivores, either from the forage supply side or the animal utilization side. It would be especially valuable for those involved in advising graziers as to grazing methods and grazing systems because it is grounded in science and provides the basic grazing principles and the plant, animal, and environmental interactions. The book is remarkably complete and would be valuable for someone interested in domestic livestock grazing or for someone interested in grazing of wild herbivores. Dr. Vallentine has combined a career of practical experience with the published literature in producing, and now updating, this comprehensive book on grazing management.

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Seed Technology and Its Biological Basis. Edited by M. BLACK and J.D. BEWLEY. CRC Press, 2000 NW Corporate Blvd., Boca Raton, FL 33431-9868. 2000. Hardback. 419 pp., \$139.95. ISBN 1-84127-043-1.

This book is edited by two successful authors who have previously written several textbooks which have made a major contribution for graduate level classes in seed biology and seed physiology. After seeing the title for this book, I expected information on the biological basis of seed technology as it relates to the regeneration of plant species. The book contains 11 chapters which instead focus primarily on seed composition for food and industrial use with little emphasis on seed technology. Although each chapter is well written by an acknowledged expert, the title could mislead a prospective reader who is expecting a focus on seed technology as commonly interpreted.

The chapters in the book are divided into four sections. The first section, "Seeds as a major world resource," includes an introductory chapter, "The value of seeds," and three additional chapters which reflect a comprehensive coverage of seed protein, carbohydrate, and oil biochemistry. The first chapter presents a historical review of the role of seeds of major food crops, but provides limited information on seed production, seed quality, and crop establishment, which is focused primarily on procedures and research in the UK. The next three chapters on seed proteins, carbohydrates, and oils thoroughly cover the biochemistry and physiology of these subjects in seeds. These chapters should prove a useful resource on seed chemistry and quality characteristics from an end-use perspective.

The second section of the book, entitled "Special cases and uses," is focused on biotechnology and molecular approaches to exploit seed composition for food or industrial use. The chapters on wheat and barley provide excellent reviews of